Marks: 100

Name:_____   Time 2 hours

1 **(a) (i)** Divide $24 in the ratio **7 : 5**.   [1]

  (ii) Write $24.60 as a fraction of $2870. Give your answer in its lowest terms.   [2]

  (iii) Write $1.92 as a percentage of $1.60   [1]

(b) In a sale the original prices are reduced by 15%.
  (i) Calculate the sale price of a book that has an original price of $12.   [1]

  (ii) Calculate the original price of a jacket that has a sale price of $38.25   [2]

(c) (i) Dean invests $500 for 10 years at a rate of 1.7% per year simple interest.
    Calculate the total interest earned during the 10 years.   [2]

(ii) Ollie invests $200 at a rate of 0.0035% **per day** compound interest.
Calculate the value of Ollie's investment at the end of 1 year. [2]

(iii) Edna invests $500 at a rate of r % per year compound interest.
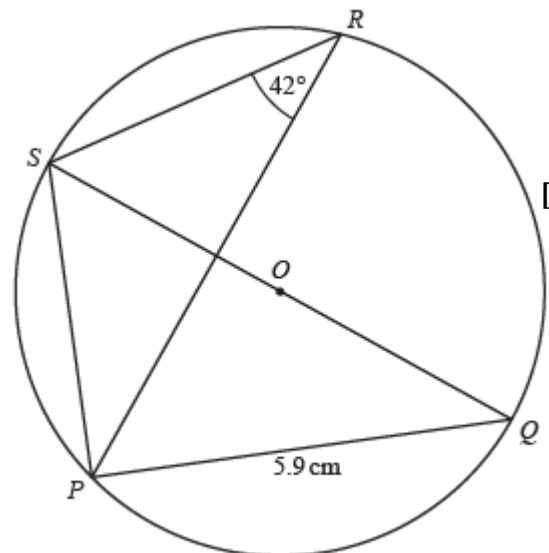At the end of 6 years, the value of Edna's investment is $559.78 .
Find the value of r. [3]

2 (a) The interior angle of a regular polygon with n sides is 150°.
Calculate the value of n. [2]

(b) P, Q, R and S are points on a circle, centre O.
QS is a diameter.
Angle $PRS = 42°$ and $PQ = 5.9$ cm.
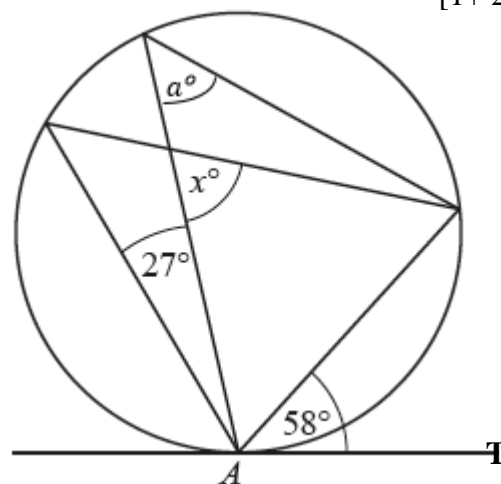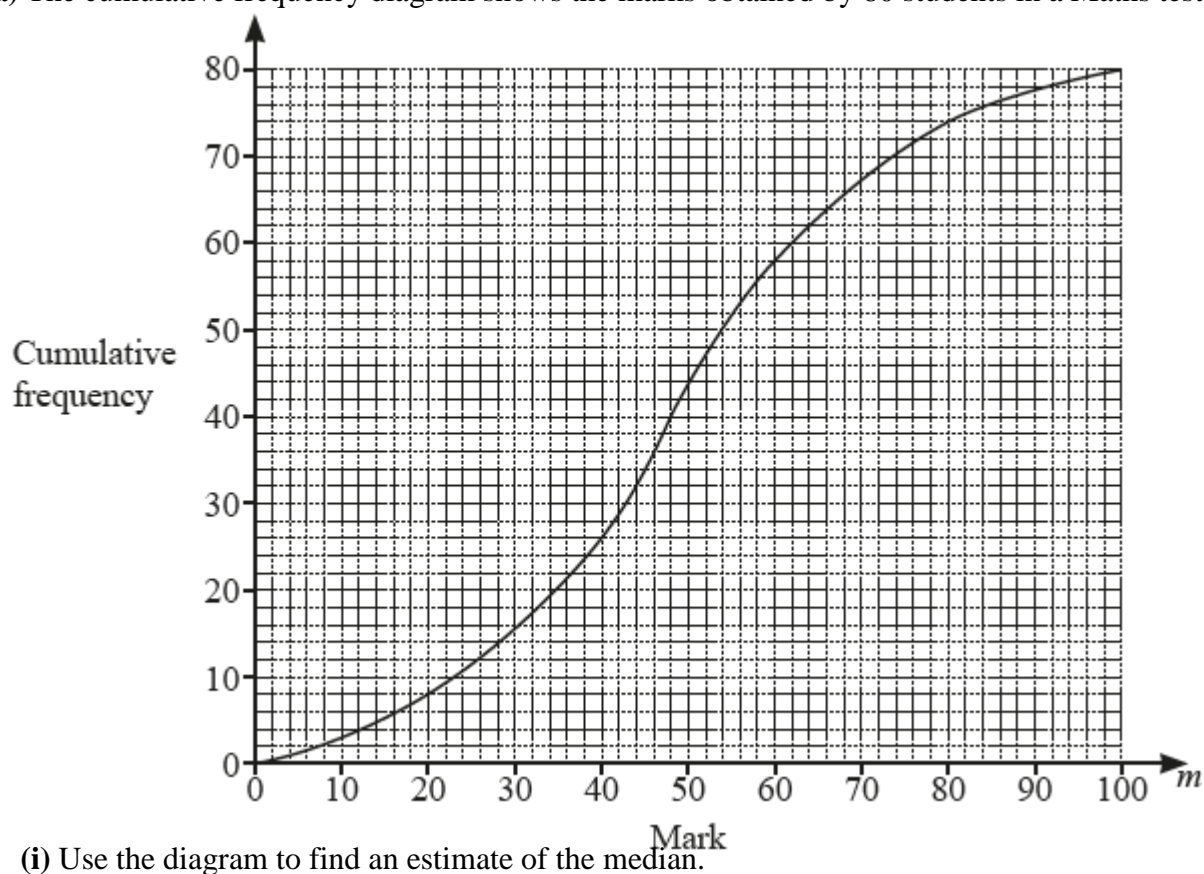Calculate the circumference of the circle. [4]

(c) *AT* is a tangent to the circle at *A*.   [1+ 2]

Find the value of   **a and x**.

3 (a) The cumulative frequency diagram shows the marks obtained by 80 students in a Maths test.

(i) Use the diagram to find an estimate of the median.   [1]

(ii) Use the diagram to find interquartile range.   [2]

(iii) 60% of the students passed the test.
Use the diagram to find the number of marks needed to pass the test.   [2]

(b) The times taken by the 80 students to complete a Science test are shown in the frequency table.

Time (m minutes)	$40 < m \leqslant 50$	$50 < m \leqslant 60$	$60 < m \leqslant 70$	$70 < m \leqslant 80$	$80 < m \leqslant 90$
Frequency	8	13	p	20	q

An estimate for the mean time taken to complete the test is 67.625 minutes.
This is calculated using the mid-interval value as an estimate of the time in each interval.
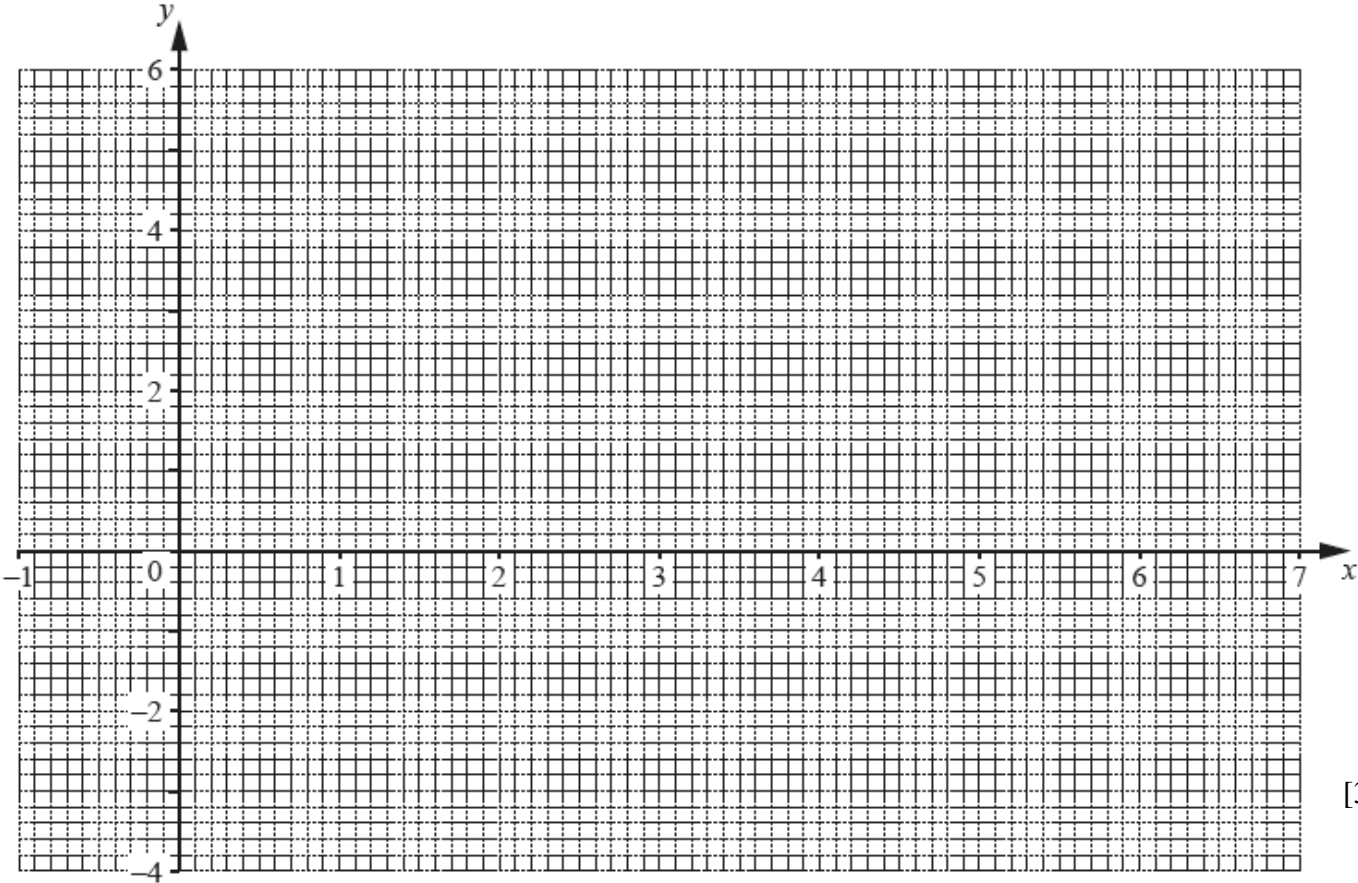Calculate the value of p and the value of q. [5]

4   **(a)** Complete the table for $y = \dfrac{x^2}{2} - 3x + 2$.

x	-1	0	1	2	3	4	5	6	7
y		2	-0.5	-2	-2.5	-2	-0.5	2	

[1]

(b) Draw the graph of $y = \dfrac{x^2}{2} - 3x + 2$ for $-1 \leqslant x \leqslant 7$.

[3]

  (c) By drawing a tangent, estimate the gradient of the curve at $x = 1.5$ [2]

(d) Complete these inequalities to describe the range of values of x where $y \geq 0$

$x \leqslant$ .... , $x \geqslant$ ....   [2]

(e) (i) On the same grid, draw the line $4y + 3x = 12$.   [2]

(ii) The *x*-coordinates of the points of intersection of this line and the curve are the solutions of the equation $2x^2 \ Ax + B = 0$

Find the value of *A* and the value of *B*. [2]

5 (a) Tomas sells a computer, a bike and a phone.
The amounts he receives are in the ratio $computer : bike : phone = 14 : 17 : 9.$
(i) Calculate the amount he receives for the phone as a percentage of the total. [2]

(ii) The total amount he receives is $560. Calculate how much he receives for the bike. [2]

(iii) Tomas originally bought the bike for $195. He wanted to make a profit of at least 25% when he sold it.
Does Tomas make a profit of at least 25%? You must show all your working to support your decision .[3]

(b)i) Ulla invests $725 for 6 years in an account paying simple interest at a rate of 1.3% per year.
Calculate the total interest earned at the end of 6 years. [2]

ii) Ulla invests $700 for 6 years in an account paying compound interest at a rate of 0.8% per year.
Calculate the **total interest** earned at the end of 6 years. [2]

(c) In a sale, all prices are reduced by 24%. Victor pays $36.86 for a pair of shoes in the sale.
Calculate the original price of the shoes. [2]

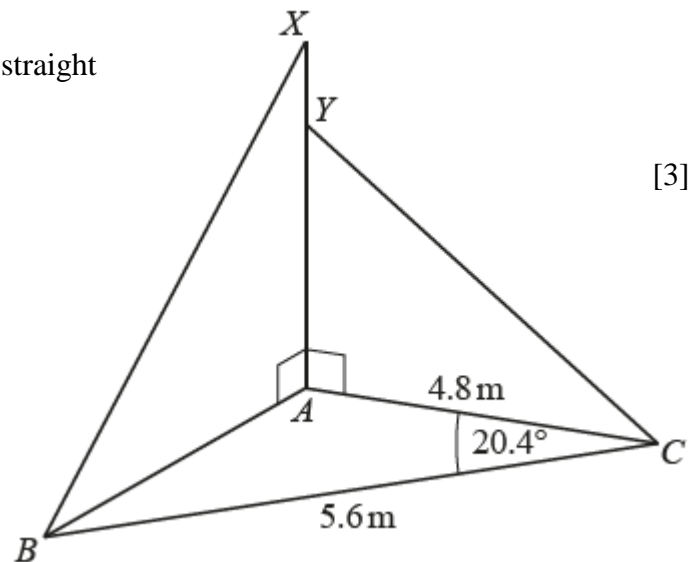**6 (a)** Simplify $\dfrac{x^2y-8xy}{2x^2-13x-24}$ [3]

(b) *ABC* is a scalene triangle on horizontal ground.
AYX is a straight vertical post, held in place by two straight
wires *XB* and *YC*.
AC = 4.8 m, *BC* = 5.6 m and angle *ACB* = 20.4°.
   (i) Calculate *AB*.   [3]

   (ii) Angle *XBA* = 64°. Calculate *AX*.   [2]
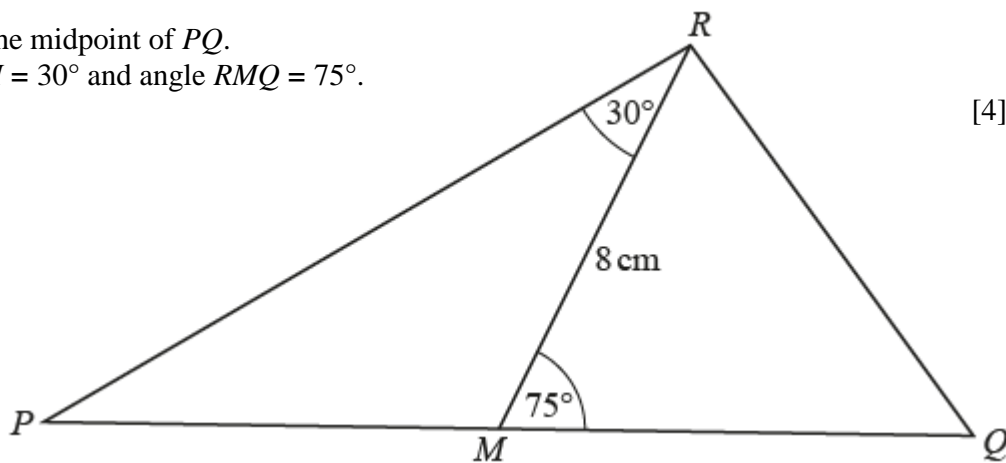
(iii) *AY* = 2.9 m. Calculate the area of triangle *YAC*.   [2]

(c) i) In triangle *PQR*, *M* is the midpoint of *PQ*.
   RM = 8 cm, angle *PRM* = 30° and angle *RMQ* = 75°.
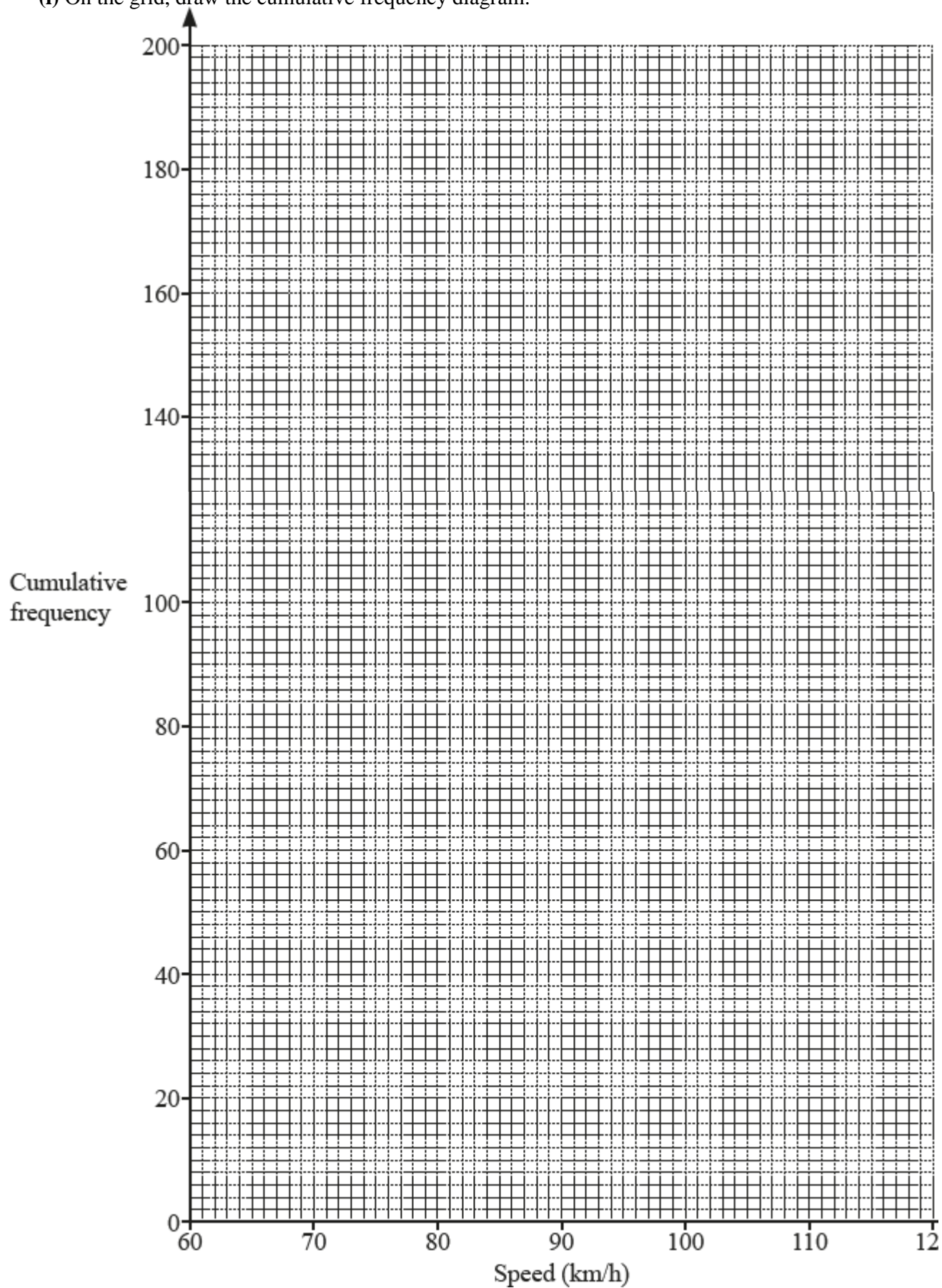   Calculate *PQ*. [4]

(ii) Calculate the area of PRQ [5]

7 (a) The cumulative frequency table shows information about the speed of each of 200 cars as they pass a speed camera.

Speed (*v* km/h)	$v \leq 70$	$v \leq 80$	$v \leq 90$	$v \leq 95$	$v \leq 100$	$v \leq 120$
Cumulative frequency	12	46	115	155	177	200

(i) On the grid, draw the cumulative frequency diagram. [3]

(ii) Use your cumulative frequency diagram to find an estimate of

    (a) the median [1]

(b) the interquartile range [2]

(c) the number of cars with a speed greater than 110 km/h. [2]

(b) The frequency table shows information about the mass of each of 50 trucks.

Mass $(m\,kg)$	$2000 < m \leqslant 2600$	$2600 < m \leqslant 3500$	$3500 < m \leqslant 5000$	$5000 < m \leqslant 5700$
Frequency	12	15	16	7

(i) Calculate an estimate for the mean mass of the trucks. [3]

(ii) In a histogram showing this information, the height of the first block is 6 cm.
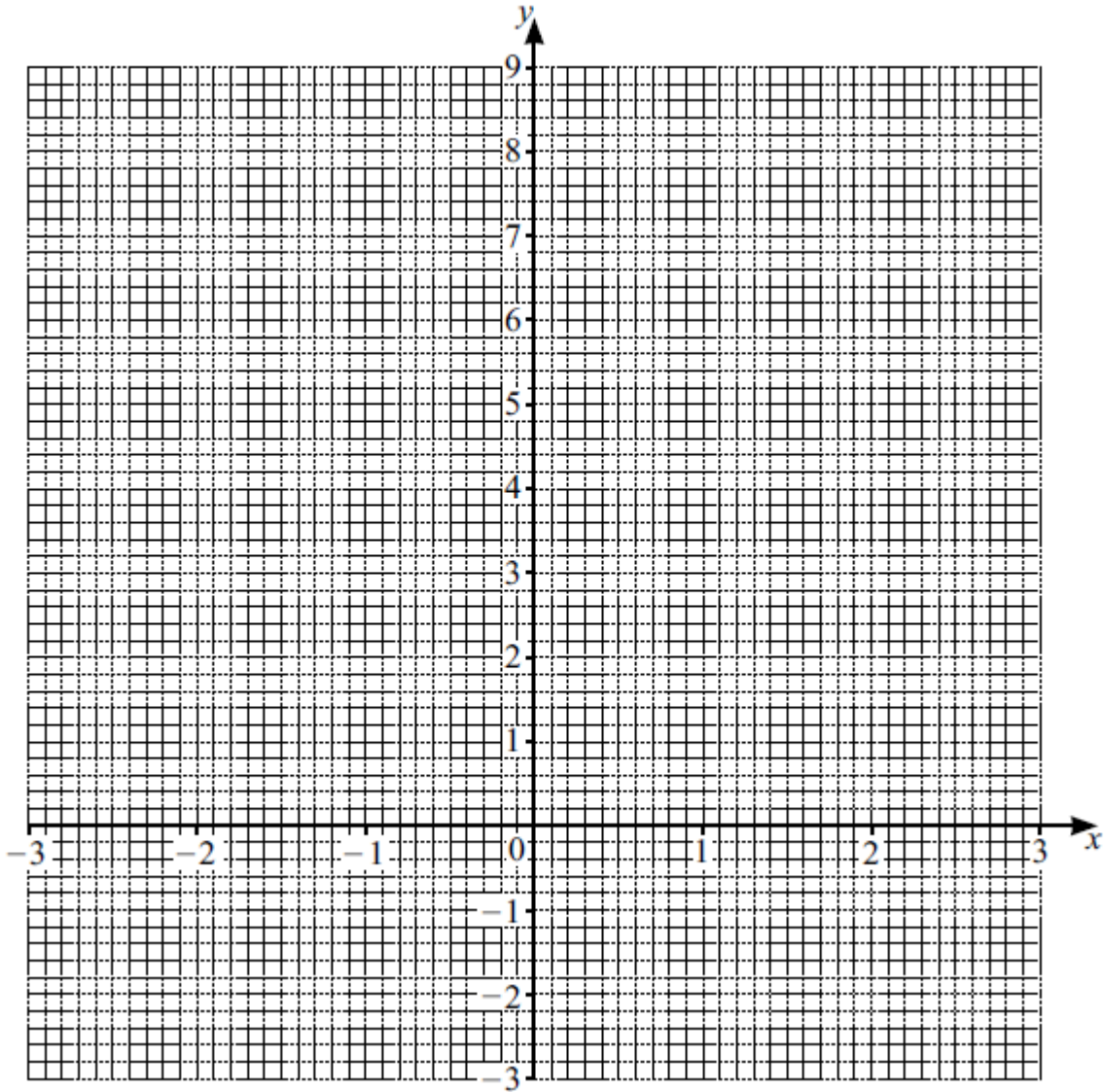Calculate the heights of the remaining three blocks. [3]

Height of block for $2600 < m \leqslant 3500$ .... cm

Height of block for $3500 < m \leqslant 5000$ .... cm

Height of block for $5000 < m \leqslant 5700$ .... cm

8 The table shows some values for $y = \dfrac{x^3}{3} - 2x + 5$ correct to 1 decimal place.

x	-3	-2.5	-2	-1	0	1	2	2.5	3
y		4.8	6.3	6.7	5.0	3.3	3.7	5.2	

(a) Complete the table. [2]

(b) Draw the graph of $y = \dfrac{x^3}{3} - 2x + 5$ for $-3 \leq x\ 3$. [3]

(c) By drawing a suitable line on the grid, find the roots of the equation $\dfrac{x^3}{3} - 1.5x + 1 = 0$ [3]

x = ... or x = ... or x = ...